**STOICHIOMETRY PROBLEMS 2**

1. Automotive air bags inflate when sodium azide, NaN3 , rapidly decomposes:

**2NaN3(s)** **Na(s) + 3N2(g)**

a. How many moles of N2 are produced by the decomposition of 2.50 moles of NaN3?

b. How many grams of NaN3 are required to produce 6.00 g N2(g)?

1. Detonation of nitroglycerin (C3H5N3O9) proceeds as follows:

**4C3H5N3O9(l)****12CO2(g) + 6N2(g) + O2(g) + 10H2O(g)**

1. How many grams of nitroglycerin are needed to produce 25.0 grams of CO2?
2. How many grams of water are produced by 8.02 g of nitroglycerin?
3. The complete combustion of octane, C8H18, a component of gasoline, proceeds as follows:

**2C8H18(l) + 25O2(g)** **16CO2 + 18H2O(g)**

1. How many moles of oxygen are needed to burn 15 moles of octane?
2. How many grams of CO2 are produced by 5.00 g of octane?
3. The fermentation of glucose (C6H12O6) produces ethyl alcohol (C2H5OH) and CO2:

**C6H12O6(aq)****2C2H5OH(aq) + 2CO2(g)**

1. How many moles of carbon dioxide are produced when 0.400 mol of glucose reacts in this fashion?
2. How many grams of glucose are needed to form 7.50 g C2H5OH?
3. How many grams of hydrogen gas would be produced from the decomposition of 124.5 grams of water vapor? (write a balanced equation first!)
4. Hydrofluoric acid, HF(aq), cannot be stored in glass bottles because compounds called silicates in the glass are attacked by the acid. Sodium silicate (Na2SiO3), for example acts as follows:

**Na2SiO3(s) + 2HF(aq)** **H2SiO3(aq) + 2NaF(aq)**

1. How many grams of NaF form when 25.7 g of HF reacts with excess sodium silicate?
2. How many grams of Na2SiO3 can react with 0.800 g HF?
3. How much hydrogen chloride gas can be produced from an excess of calcium chloride and

145.99 g of water vapor? (Write a balanced equation!)

1. What mass of water vapor and carbon dioxide are produced by the combustion of 33.6 g of methane, CH4? (Write a balanced equation!)